

Anthrax: What Livestock Producers Should Know

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Anthrax is as old as antiquity. The fifth plague in the Bible's Book of Exodus speaks of "the hand of the Lord bringing a terrible plague on your livestock in the field – on your horses and donkeys and camels and on your cattle and sheep and goats". Some believe that the sudden death of these animals was due to anthrax. More recently, anthrax has been the topic of several news articles addressing concerns about vaccinating soldiers in the US military, bioterrorism threats, and naturally occurring disease outbreaks in cattle. Recent anthrax outbreaks in cattle include:

- Manitoba - 25 cattle die on five farms
- Minnesota - 15 cattle die on two farms
- North Dakota - 17 herds lose approximately 100 cattle to anthrax

Other deaths have been reported in South Dakota and Nebraska. While deaths from anthrax occur sporadically every year, these outbreaks in the Midwest are somewhat unusual. The California Department of Food and Agriculture has historical records of 34 anthrax outbreaks in 12 California counties. During 1984, an anthrax outbreak occurred in the Carrisa Plains that affected 12 general areas, and killed 43 cattle and 135 head of sheep. Since 1991, there have been 10 known cases of anthrax in California, nine of which occurred in cattle. Producers should be aware of the signs and risk factors of anthrax in cattle.

The bacteria *Bacillus anthracis* causes anthrax in all warm-blooded animals, including people. The bacteria are found in two states – the vegetative state and the spore state. The vegetative state is the growing, reproducing form of the bacteria found in infected animals and people, and is the state that causes the disease anthrax. If untreated the disease in animals is generally fatal, and if the carcass is opened by veterinarians performing a necropsy, scavengers, or by decay, the vegetative state is exposed to oxygen in the air. When the vegetative state is exposed to oxygen, it forms spores. The spores are highly resistant to disinfectants, remain viable for years in the soil, and are found naturally in the soil of California and many western states. When the spores enter another animal, usually through grazing contaminated vegetation or inhalation, the bacteria revert to the disease-causing vegetative form.

In cattle, the most commonly seen initial sign of anthrax is sudden death. The course of the disease is usually short and ranges from 1-3 days. Once an outbreak begins, animals may be seen with fever, lack of rumination, excitement followed by depression, difficulty breathing, uncoordinated movements, and convulsions. These signs progress towards death. Bloody discharges from the natural body openings, as well as edema in different parts of the body, are sometimes observed. Some animals may be saved if treated very early with penicillin or tetracyclines.

In animals that die, bloody discharges from the body openings may be seen. Decomposition is more rapid than in other conditions and the carcasses become bloated with gases. Rigor mortis, or stiffening, is not complete. When necropsied, hemorrhages are found in the internal organs. Enlargement of the spleen is almost always present. An open, decaying carcass, as well as discharges and secretions from the carcass or dying animals, will contaminate the ground and protected spores will develop. Scavengers or veterinarians seeking to learn the cause of death may also open the carcass. Carrion-feeding animals may carry the infection to other distant locations. However, in unopened carcasses the vegetative form of the bacteria dies rapidly and does not form spores.

Most outbreaks occur in areas where animals have previously died of anthrax, as the spores remain viable for many years. Spores more than 35 years old have been able to cause disease. Often, the outbreaks occur after climatic change such as heavy rains, flooding, or drought. Climatic change brings spores to the ground surface and perhaps concentrates the spores in low spots. Working the land may also bring the spores up to the soil surface. Once the animals eat the spores, the vegetative state develops, multiplies, and causes anthrax. In August 2000, an anthrax outbreak in Nevada killed 30 cattle. This outbreak was associated with a recent cleaning of a ditch that may have disturbed spores deep in the soil.

When anthrax is suspected, dead animals should not be opened for routine examination, as the discharges and blood are highly infectious to humans and other animals. As previously stated, open carcasses will deposit enormous quantities of bacterium on the ground that will sporulate to the long-lasting, protected state. Your veterinarian can confirm anthrax by taking blood from a peripheral vein (ear or tail) and submitting it to the diagnostic laboratory. The bacteria can be seen in the blood when properly smeared and stained on a glass slide. There are other alternatives to a full necropsy.

In many states, anthrax is a reportable disease and your veterinarian is required to inform the state animal health agency when cases of anthrax are suspected. Quarantine of the premises and animals may be necessary. To prevent the spread of an outbreak, when possible, dead animals should be burned where they are found. An alternative is to bury the carcasses at a depth of 10 feet and cover the carcass with lime. The 1984 Carrisa Plains outbreak was associated with the movement of an infected band of sheep and the dumping of carcasses from this band in several locations. Improper carcass disposal may put other animals and people at risk. Your state animal health agency can provide helpful advice on carcass disposal and assist your veterinarian in controlling the outbreak. Vaccines are available to protect animals in endemic areas or when outbreaks occur.

Always keep in mind that anthrax can cause serious disease in people as well as animals. Three syndromes are recognized in people. The *cutaneous form* is usually seen in people who work with animal carcasses, wool, hides or fur. The infections are seen as large, local abscesses, black lesions, and edema often on the hand or finger. If untreated, these skin infections can spread to the blood stream and cause serious illness or death. More than 90% of human anthrax cases worldwide are the cutaneous form. In the last 15 years, there have only been 5 cases of human anthrax in the US and all have been the cutaneous form. Breathing in the bacteria causes the *pulmonary form*. Most lung infections result in rapid death. The *gastrointestinal form* results from eating the bacteria, usually in contaminated, undercooked meat, and is seen as violent intestinal pain with vomiting and bloody stools.

In August 2000, a Minnesota farm family of six slaughtered and sent a carcass from a down steer to a custom meat-processing plant. The steer was from a group of animals later confirmed to have had anthrax. After consuming the meat two reported gastrointestinal illness and anthrax was recovered from the uncooked meat. The entire family was given antibiotics to prevent anthrax and vaccinated against anthrax. Seven carcasses processed in the custom plant after the infected steer were condemned.

A high mortality rate is seen with the gastrointestinal form of anthrax if it is not recognized and treated. Meat originating from animals dying of unknown causes or suspected of having anthrax or any other infectious disease should not be consumed. Due to the potential for anthrax to produce serious, life-threatening disease in people, great care should be taken to protect anyone handling the carcass or live animals suspected of having anthrax.

In summary, anthrax is caused by bacteria that can exist in two forms. The vegetative form causes disease in both animals and people, but is rapidly killed in unopened carcasses. The spore form lives for years in the soil. When the spores surface, they revert to the vegetative form to cause further disease when eaten by animals. Carcasses of animals dying from anthrax should not be opened, because the vegetative form turns to spores when exposed to air. Use caution when handling animals or animal carcasses suspected of being infected with anthrax. Suspected cases of anthrax should be reported **first** to your veterinarian and then to state animal health officials. District animal health officials are available 24 hours a day to assist your veterinarian in managing an outbreak and minimizing losses.

For more information in California, call:

CDFA, Animal Health Branch

Headquarters (916) 654-1447

Redding District (530) 225-2140

Modesto District (209) 491-9350

Tulare District (559) 685-3500

Ontario District (909) 947-4462

Or visit the CDFA-Animal Health Branch Emergency Programs website at:

http://www.cdfa.ca.gov/ahfss/ah/emergency_management.htm